



Iowa Cyber Hub Education and workforce development

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Outline

- > Cyber security overview
- > Educational pathways
- > General cybersecurity training for non-IT staff
- > Upskill current workforce
- > Projects

The adversary:

- Attackers can vary from script kiddies to professional hackers and nation states
- They use both technology and social skills to attack



Objectives



- Money
 - Theft diversion, account access, ransomware
- Data
 - Disclosure, reuse, first step to another attack
 - Altering data
- Internet of Things
 - Service disruption, vector to another attack
- Public Trust



TRUST

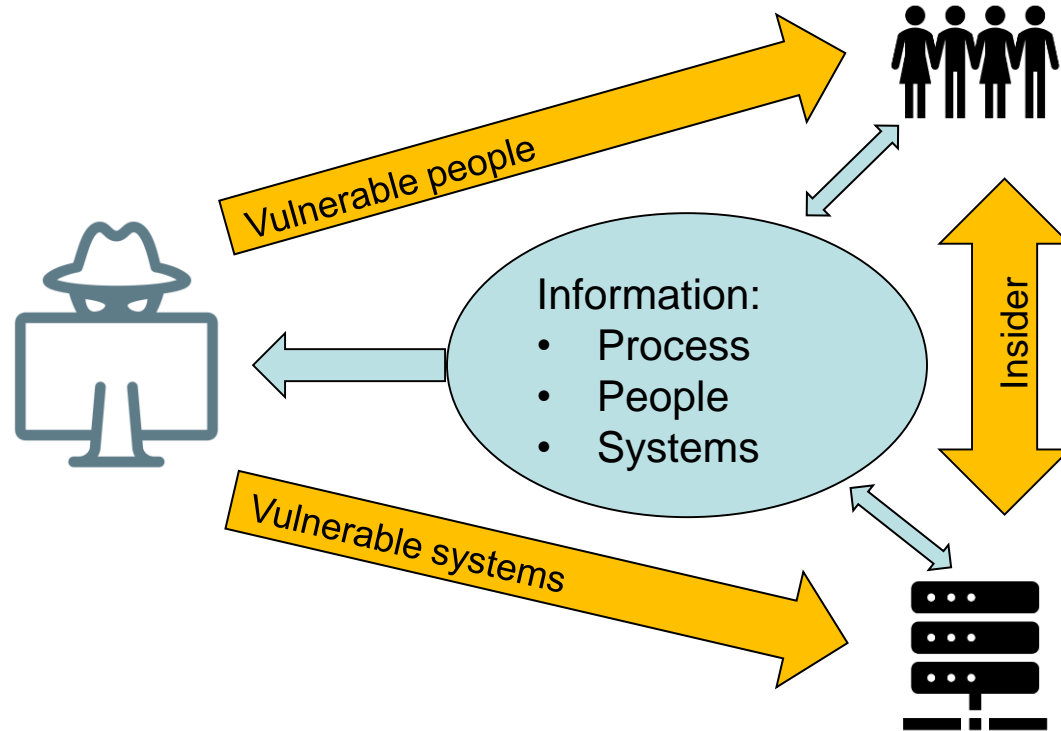


Targets

- **Data Systems** – contain critical data
 - IP, CC#, PII, etc
 - Estimated over 37 Billion records lost in 2021
- **Process Systems** – needed for operation
 - Often part of ransomware attack
 - Billing, inventory, medical
- **Control Systems** – control physical assets
 - Pipelines, power grid, traffic control



Attack Vectors



Now let's talk about defense

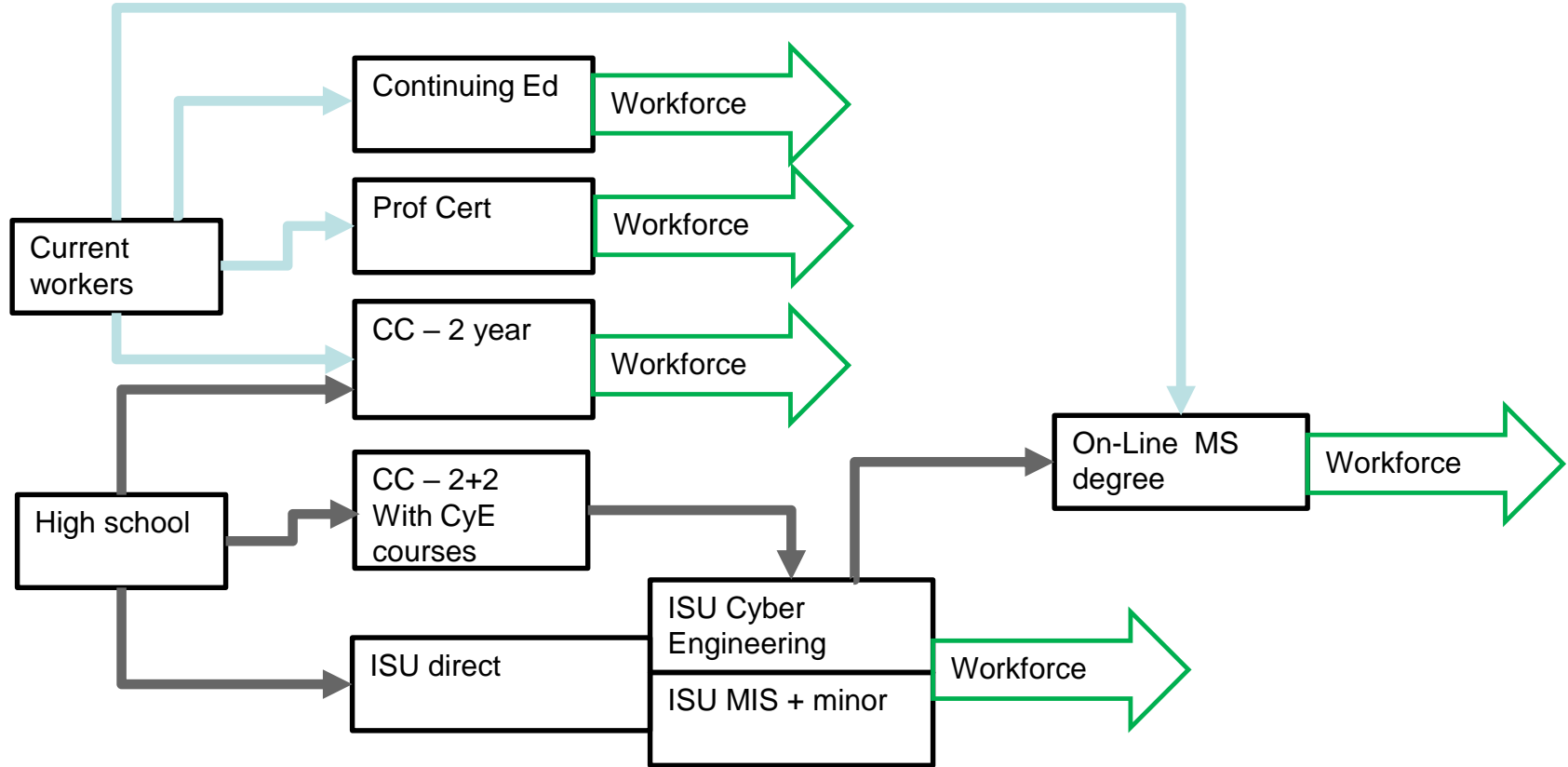
- First cyber security is an unfair war
 - Defenders must be perfect
 - Attackers only need to get it right once.
 - Law enforcement often cannot tell if something happened.
- Let's look at where we are at
 - Prevention (defense)
 - Detection
 - Attribution



What is the Iowa Cyber Hub

- The goal of the Iowa Cyber Hub is to create a safe and secure Iowa by delivering security literacy to all Iowans, providing educational pathways to grow the cyber workforce, and enhance the security capabilities to the benefit of the State, Region, and Nation.
 - Educational pathways
 - Projects
 - How we can help

Cyber Security Pathways



Credit based Cyber Security Education

• ISU @ ISU

- New B.S. degree in Cyber Security Engineering
 - Started fall 2019
 - ABET criteria for Cyber Security Engineering
- Cyber security minor will remain in place
 - MIS, CprE, SE, Com S

Professional Certificate in Cybersecurity

- Designed for students with an A.A.S in cyber security
 - Additional courses at community colleges to up skill IT workers to enter the cert
- Module based
 - 2 credit, 8-week modules
 - Exploring micro credentials
- Status:
 - Surveyed Iowa business and industry for content
 - Identified technical and professional skills courses. Mapping to NICE KSAs
 - Starting to develop modules.

Minor in Applications of Cybersecurity

- The minor in Applications of Cybersecurity is designed for students at ISU majoring in non-computing disciplines.
- Students who complete this minor will learn cybersecurity in the context of their declared major or discipline.
- The 15-credit minor will consist of:
 - seven basic credits in cybersecurity concept courses consisting of foundational and skills-specific topics
 - two credits from a capstone project
 - six double-counted credits from existing program courses.

Credit based Cyber Security Education

@CC Community colleges (2 year degree)

- 2 year degree in cyber security
 - DMACC, others are coming on-line
- Security courses as part of another program
- Exploring ways for all community colleges to be able to offer cybersecurity

Credit based Cyber Security Education @CC

- Community colleges (Pre-engineering)
 - Add 2 or 3 ISU cyber courses to the program of study
 - Align community college pre-engineering program to ISU cyber security requirements
 - Enhance recruiting efforts

Current workforce

- 2 year degree through community college
- Professional certificate (currently offered by DMACC)
 - For students with a BS (in anything)
- ISU Professional Certificate
- Non-Credit offerings (next slide)

Non-Credit efforts

- Pilot project with DMACC and ISU to offer half day hands-on cyber security workshops.
- Other community colleges have reached out to ISU asking for help to provide cyber security training to local business and industry.

Recruitment

- Goal is to provide resources for schools to help introduce cyber security as a career.
- Statewide effort to help build the pipeline and show students pathways
- Key elements are:
 - Innovate-IT
 - Community college efforts in schools
 - Security-literacy curriculum for K-12 schools

Projects

- CySim
- CyberEd
- ReCIPE

CySim: A cybersecurity sports complex

- CySim is a physical space supported by virtualization that can be configured to simulate various environments and provide a realistic scenario.
- CySim will support scenario-based exercises for classes, students, and educators.
- CySim will allow interdisciplinary teams to work together to practice cyber threat mitigation strategies.
- CySim will also support case study-type classes with students from many different disciplines.

CyberEd group

- The CyberEd team is dedicated to creating new cybersecurity education for Iowa and beyond.
 - **Literacy:** Cybersecurity education for all
 - **Exercises and Training:** Specialized cybersecurity modules for educational and training purposes
 - **Courses and Degrees:** New opportunities for students to learn cybersecurity and apply it to their career and degree goals
 - **Pathways:** New educational options for students, graduate and professionals to earn cybersecurity degrees and credentials, tailored to their career and/or goals



ReCIPE

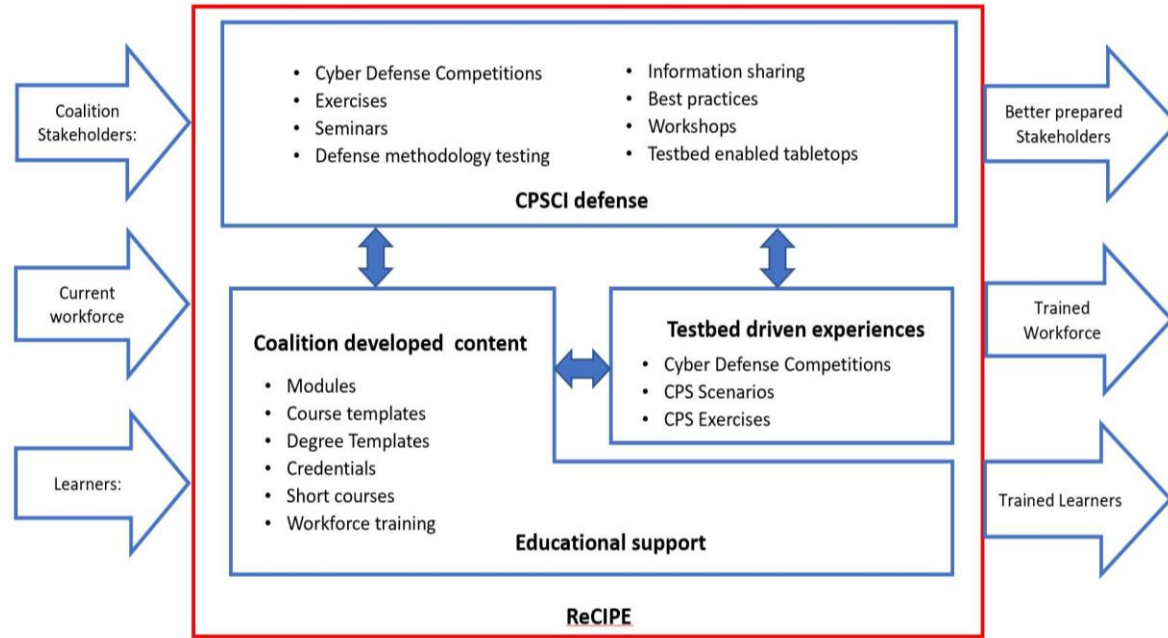
Regional Coalition for Critical Infrastructure Protection, Education, and Practice (“ReCIPE”)

- > **Project team:** Iowa State University (Lead), University of Illinois
- > **Initial Coalition Partners:** Iowa National Guard, Iowa Homeland Security, Illinois National Guard, MidAmerican, Associate of Illinois Electric Coops, Illinois Manufacturing Association, City of Ames, Argonne National Lab, Moraine Valley Community College, University of Colorado at Colorado Springs
- > **Iowa State:** Doug Jacobson (PI), Manimaran Govindarasu (co-PI), Anne Kimber (co-PI)
- > **University of Illinois, Urbana-Champaign:** David Nicol (co-PI), Dominic Saebeler (co-PI), Casey O'Brien (co-PI)
- > www.recipe-coalition.org
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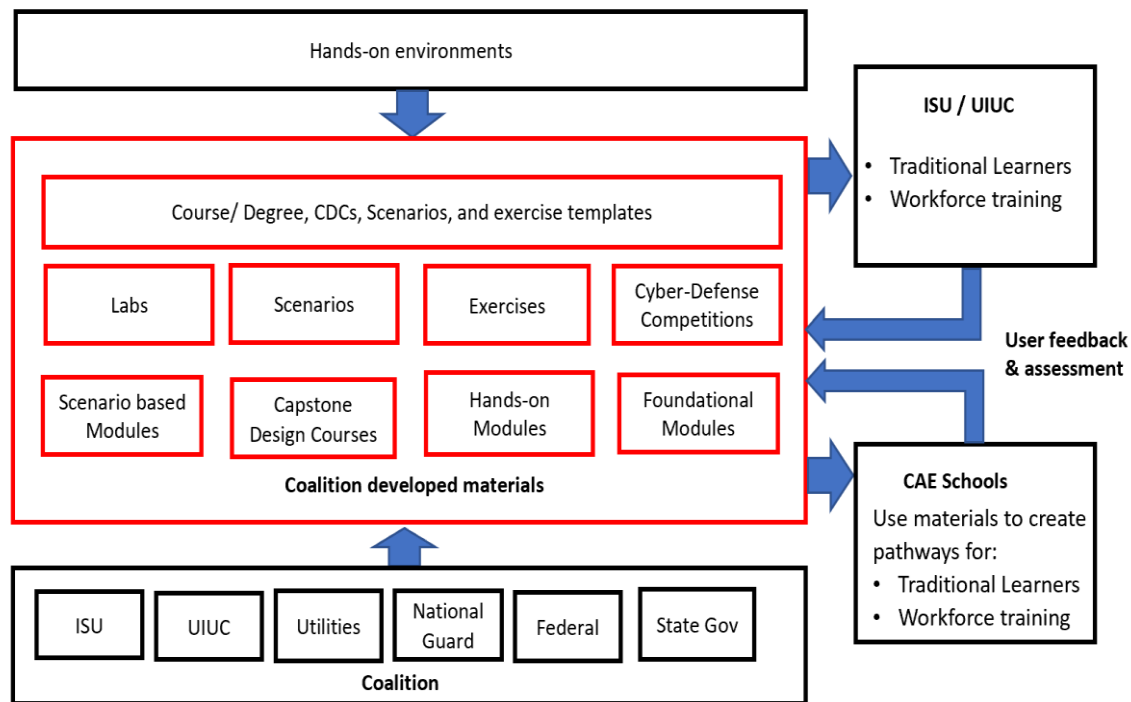
About ReCIPE

- **The Midwest is a largely rural environment**, with large number of municipal utilities and power co-ops, which exacerbates the challenge of adequate resources for cybersecurity technology and workforce training.
- This coalition will **facilitate partnerships** between regional universities, government, and industry partners to address the **emerging cybersecurity challenges**, **develop defense strategies**, and **bridge the knowledge gap** to secure our nation's critical infrastructures.
- The coalition will **influence innovative defense practices** and create **learning solutions** to make immediate impacts in the security of region's critical infrastructures.

ReCIPE Education & Cyber Defense



ReCIPE Program Implementation



Three Pillars

- > **Education and workforce development**
 - > Curate content, develop curriculum (courses and training)
- > **Exercises and testbeds**
 - > Leverage testbeds to develop and host exercises
- > **Strategy**
 - > Ensure communication and feedback

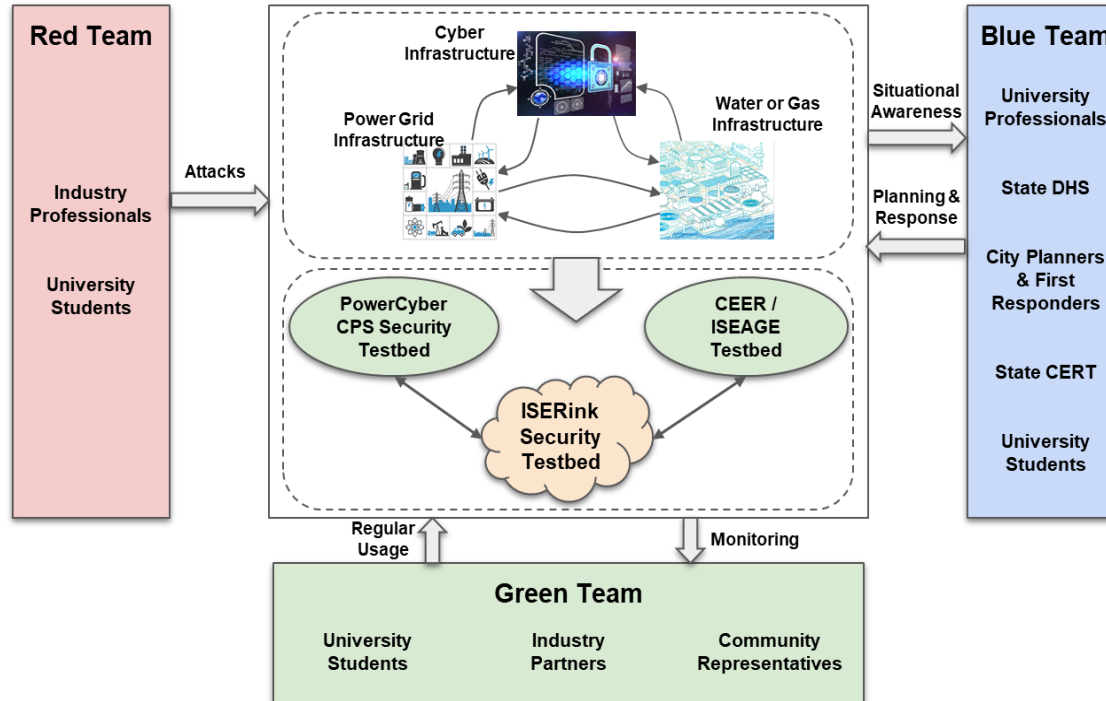
Education and Workforce

- > Effective communications (teaching technical people to communicate)
- > Cyber physical / OT training, short courses and courses
- > General cybersecurity training for non-IT staff
- > Upskill current workforce

Exercises

- > OT/IT testbed for long term use (ISEWorld)
 - > Remote access
 - > Team and individual play
- > IT/OT exercises (students and workforce)
 - > Hands-on and tabletop
- > Cross functional team exercises
 - > CySim

ReCIPE Cybersecurity Exercise





Other new Projects and Programs

- CyberReady Iowa
- Agriculture Security/ISU Extension & Outreach
- Rebranded IT-A to Innovate-IT
- Cybersecurity Faculty Fellows

Cyber hub

- Expand the Iowa Cyber Hub to include all interested schools
 - Define a state wide cyber security education strategy (credit and non-credit)
 - Create a state-wide external cyber security education advisory board
 - Common messaging (pathways, opportunities, etc.)
 - Seek external funding for common goals

Iowa Cyber Hub: Getting involved (how we can help)

- > Sector based training
 - > Technical
 - > Short articles, newsletters
- > General training
 - > Security literacy
 - > Short articles, newsletters
- > Exercises:
 - > Technical
 - > CySim

Questions

- > <http://www.iowacyberhub.org/>
- > www.cyio.iastate.edu
- > www.recipe-coalition.org
- > ReCIPE is funded by the National Security Agency under the NCAE-C-001-2021 - NCAE-C Cybersecurity Education Innovation 2021 Program.
- > Contact: dougj@iastate.edu